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ABSTRACT

Hoping to inspire greater cooperation among local school boards, administrators, teachers, and state officials, this paper reviews class size research and analyzes effective instructional methods and student learning related to class size issues. The New York State Board of Regents should not standardize class size, since standardization undercuts local options and school building leadership, curtails district flexibility in implementing mandated improvements, and undermines teacher professionalism. Small classes cannot by themselves influence learning; policy should account for numerous factors, including teacher attitudes and expectations, subject matter taught, instructional methods used, and student age. Financial demands and public accountability must be balanced against the ideal of small class size. Promising methods to obtain the effects of small classes without appreciably increasing staff size should be considered, including cross-age and peer tutoring, developmental programs, learning centers, pull-out programs, split scheduling, subject matter grouping, and team teaching. Increasing time spent on academic learning is an important goal. Policy and practice must focus on promoting extensive subject matter coverage, achieving a high individual success rate, and active involvement in instructional tasks. Staff development may be the single most important method to alter patterns of student achievement. Adequate training in small-group methods is also desirable. (20 references) (MLH)

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A Position Paper of the
NEW YORK STATE SCHOOL BOARDS ASSOCIATION

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The Impact of
Class Size

On Teaching and Learning

A Position Paper of the
NEW YORK STATE
SCHOOL BOARDS ASSOCIATION

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Table of Contents

Summary of Recommendations	iii
Introduction	v
Past Decisions, Emerging Trends	1
The School Board View	3
Class Size and Pupil Achievement	4
Review of the Literature	6
Effects of Class Size in the Elementary Grades	6
Effects of Class Size in the Secondary Grades	7
Factors Which Influence Learning	9
Increasing Academic Learning Time	10
Links Between Instructional Management and Educational Achievement	11
Educational Know-How Makes the Difference	13
Bibliography	15

Summary of Recommendations

—Class size and teaching load are matters that call for local decision making and a working out of schedules and instructional methods to promote student achievement and satisfaction between individual teachers and students, working together with school boards and administrators.

—The Board of Regents should not attempt to standardize class size. Standardization tends to undercut local options and school building level leadership, curtail the flexibility of districts to implement mandated improvements, and undermine the professionalism of teachers. There should be substantial flexibility to permit class size determination at the building or district level.

—Small classes cannot by themselves influence learning. They are only one of the conditions within which the teacher plans and implements instruction. Policy should account for a combination of factors such as teachers' attitudes and expectations, subject matter taught, instructional methods used and age level of students, all of which interact to enhance student learning.

—While sharing teachers' beliefs about the ideals of the small class, school boards and administrators must consider pragmatically the financial demands and public accountability of the educational enterprise.

—School boards and administrators should consider various methods of obtaining the positive effects of small classes without increasing staff size substantially. Promising methods include: cross-age and peer tutoring; developmental programs; learning centers; pull-out programs; split scheduling; subject matter grouping and team teaching.

—To increase time spent on academic learning is an important goal. Academic learning includes three components: time allocated to subject, student engagement with subject, and student success rate with subject.

—Policy *and* practice must focus on promoting extensive coverage of subject matter, achieving high individual success rate, and active involvement in instructional tasks. These three concepts are interdependent and must be seen as a whole if achievement is to be increased.

—Staff development in the management of learning may be the single most important method at our disposal to alter patterns of student achievement.

—Certain teaching methods associated with productive learning are easier to carry out when working with smaller groups of students, but it is equally true that teachers need to be trained to use the methods. If teachers persist in using the same strategies with small classes that they use in large classes, the advantages of the former will be lost.

Introduction

This paper explores selected policy issues to encourage a strong and informed stance by school boards and other concerned members of the educational community regarding class size, teaching load, and the underlying goal of student learning.

The issues are timely. In 1985, at least 15 states took measures designed to reduce student-teacher ratios in the elementary grades. New York State has enacted state aid provisions intended to facilitate early elementary class size reductions in the large city school districts. Furthermore, the New York State Board of Regents is scheduled to take regulatory steps concerning class size, teaching load, and perhaps even daily teaching preparations, before the beginning of the 1987 school year.

The class size debate is linked to issues of local control, both for local school boards and for teachers. For school boards, the reasons seem clear-cut. Amidst constraints created by negotiated contracts, arbitrators, and the state's Public Employment Relations Board (PERB), boards are concerned about maintaining policy discretion to remain responsive to local educational and financial circumstances. For teachers, the reasons may seem less obvious, but they are just as real.

As reforms to restructure and strengthen the teaching profession have taken shape, the degree to which public education has become rule-directed by the state has grown clearer. Teachers have felt excluded from the debate. Collectively, they have expressed strong resentment about it. This phenomenon, symbolized by the Regents Action Plan and its implementation, runs counter to a growing teacher desire for respect and professional status. For such self-esteem to materialize, teacher "empowerment" is needed. Interpretations of empowerment may vary, but most agree it would be encouraged by teacher participation in decisions which may directly affect them professionally. To participate meaningfully is to gain a sense of ownership, teamwork, and a commitment to the school district's goals.

Class size and teaching load are matters that call for local decision making and a working out of schedules and instructional methods to promote student achievement and satisfaction between individual

teacher and students, working together with school boards and adminstrators. Given the impetus toward teacher professionalism, it is not surprising that nearly half of all teachers who responded to a survey conducted at the Regents 1985 conferences on strengthening teaching either responded negatively or were unsure about whether the state should set teacher load requirements.

This paper reviews class size research and analyzes effective instructional methods and student learning in relation to class size issues. The discussion and recommendations are intended to lay the groundwork for greater cooperation among local school boards, administrators, teachers, and state officials.

Past Decisions, Emerging Trends

The New York State School Boards Association takes the position that the Board of Regents should not attempt to standardize class size. Standardization tends to undercut local options, and school building level leadership, curtail the flexibility of districts to implement mandated improvements, and undermine the professionalism of teachers. While statewide standards may be desirable, there should be substantial flexibility to permit class size determinations at the building or district level. The recommendations of specifics such as minutes of instruction, class size, and pupil load presumes that districts cannot be trusted to allocate their resources wisely and that Public Employee Relations Board (PERB) decisions on mandatory and non-mandatory items for negotiations inadequately address workload. Neither presumption is true.

More importantly, the power of local school districts over class size and teacher load is a policy consideration *entrusted* to school boards. PERB wisely decided several years ago that class size and teacher load are not a mandatory subject of negotiations because of the importance of maintaining management prerogatives which would permit local discretion in the establishment of a class for 12 to 15 students in one instance or a class of 40 in another instance.

Within New York State's educational community, some groups favor the mandating of class size and teacher load in New York State; on the other hand, some believe that setting standards undercuts local options and school building level administration. Overall, most groups agree that new state regulations may provoke unnecessary change in present secondary school schedules, impose added pressure for increased cost, and undermine district flexibility to implement Regents-mandated improvements.

The discussion of the class size/teacher load issue does not end here. Recent statistics suggest that factors in addition to the previous discussion greatly impact on class size. First, the declining enrollment in New York State presents school officials with an opportunity to reduce class size. According to a recent State Education Department report, in 1984-85 there were 1,313,620 students attending public secondary schools. In five years, it is estimated that there will be 1,147,231 public school students enrolled in grades 7-12. This will be a decrease of 12.7 percent in the total public secondary school enrollment during the period 1984-85 through 1990-91.

A second factor is the increasing shortage of teachers in the areas of science, mathematics, and foreign language. To impose new state limits on class size and teaching load when mass teacher retirements are imminent and shortages already are prevalent seems contradictory and unrealistic. Recent statistics in New York State show that the age of the teaching force in these curricular areas indicates that a large percentage of teachers are approaching retirement. In 1968, approximately one-third of teachers in mathematics, science and foreign languages were aged 41 years or older: 31.1 percent of mathematics teachers, 28.4 percent of science teachers, and 36.2 percent of foreign language teachers. In 1985, approximately three-quarters of the teachers in these three curricular areas were 41 years or older: 65.9 percent of mathematics teachers, 78.0 percent of science teachers, and 79.8 percent of the foreign language teachers.

Also, the Regents Action Plan, along with staff attrition, will produce a 30 percent increase in teacher vacancies by 1990-91. For foreign language teachers alone, there will be a 252 percent increase in demand. Mandatory restrictions on class size could devastate districts' ability simply to offer certain courses. Certainly it would reverse the noteworthy progress districts have made in reducing the number of noncertified teachers in recent years.

In 1968, noncertified teachers (those with temporary licensure or assigned to an area in which they do not possess certification) comprised 13.3 percent, 14.7 percent, and 12.2 percent of the workforce within mathematics, science, and foreign languages. By 1983, the percentage of uncertified teachers in the same curricular areas had declined to 2.5 percent, 3.0 percent, and 4.5 percent, respectively. More recent data for the 1984-85 year exemplify the same trend. This trend attests to the strengthened quality of teachers in New York State; class size limits could compromise the progress.

The need for new state limits is made even more questionable by the historically local commitment of New York State public schools to keep pupil-teacher ratios consistently lower than the national average. For example, in 1972, national figures showed a ratio of 21.5 and New York State 19.0. In 1982, national figures showed a ratio of 19.5 and New York State figures showed a pupil-teacher ratio of 16.5. In 1984-85, national figures showed a pupil-teacher ratio of 19.4 and New York State showed a ratio of 15.4. The secondary pupil-teacher ratios in New York State were approximately 14.8 statewide with slightly higher ratios in the state's larger urban districts. The Information Center on Education anticipates that over the next five years secondary pupil-teacher ratios will decrease to 13.4 by 1990-91, a 9.5 percent decline.

The School Board View

Many teachers, individually and in represented groups, have looked at the question of class size and pupil achievement. They have stressed that small classes enhance classroom effectiveness, facilitate learning, allow flexibility in instructional strategies and reduce discipline problems and teacher preparation time.

Small classes, however, cannot by themselves influence learning. They are only one of the conditions within which the teacher plans and implements instruction. Presumably, some kinds of instruction are more feasible in a small class. And these instructional activities *lead* to greater student learning. Policies should account for a combination of factors (e.g., instructional method, subject matter, age-level) which interact within the classroom environment to enhance student learning.

Most of the improvements in student achievement that occur within the smaller class may be attributable to improvements in the teachers' style and plan of instruction, not to the reduction of class size. Learning gains in small classes are not necessarily *caused* by class size reduction, but by teachers' attitudes and expectations.

School boards and administrators generally share teachers' beliefs about the ideals of the small class. However, they must consider pragmatically the financial demands and public accountability of the educational enterprise. Can positive effects of small classes be achieved, for example, without doubling the amount of money that a school district must pay in teachers salaries?

There are ways to do it. One strategy is cross-age and peer tutoring. There, tutors provide individual assistance to students thereby allowing teachers more time to work with individuals or small groups of students. Another strategy involves the use of developmental programs that group children on the basis of physical development. The main purpose is to prevent students from failing and to provide them with additional time to develop.

A third strategy, learning centers, enables teachers to work with smaller groups of students. Learning centers are usually set up as separate areas of the classroom. Teachers feel that reducing their instructional group size gives students more time to practice basic skills learned in the classroom. Pull-out programs, staggered or split scheduling, subject matter grouping, and team teaching are additional

programs that may be used to obtain positive effects of small classes, without exorbitantly increasing the amount of money that a school district must pay in teachers salaries simply to achieve smaller class sizes across the district at all levels.

Class Size and Pupil Achievement

The class size issue continues to be one of the most controversial problems confronting educational administrators, teachers, and policymakers. The crux of the issue involves an attempt to determine the optimal class size for positive pupil achievement. The answer that currently dominates class size research is: the smaller the better. In general, teachers and others believe strongly that smaller classes provide a high quality educational environment and promote greater student learning. This is not always the case. Ideally, the magic number may be an essential issue, but it is not the whole story on class size research. The questions of optimal class size for what (i.e., instructional activities), for whom (i.e., student population), and under what organizational arrangements (i.e., team teaching and alternative education) are also viable issues that relate to class size research.

Class size research dates back to the early 1900s with a study by Rice (1902). Since then, studies on the issue have become voluminous and wide-ranging, covering such topics as the effects of class size on pupil attitude, teacher morale and attitudes, classroom methods, policy decisions, and school district finances. Unfortunately, the result of this research does not lend itself to clear, conclusive, "problem free" findings.

One of the major problems concerns the question of teacher load. This issue is inadequately treated in the class size research. Whereas there is an abundance of research on class size, there is little on teacher load. This should not be the case. Conceptually, class size and teacher load, although related, are separate issues and should be treated as such.

The second is a problem of definition. Researchers and educators tend to disagree on what constitutes small and large classes; these two terms vary in meaning from one research report to another. For example, Shane (1961) referred to a small class as fewer than 30 students and a large class as 30 students or more. And Pugh (1964) reported that a small class is fewer than 20 and a large class is more than 30. In a somewhat similar vein, Woodsen (1968) described a small class as

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fewer than 22 and a large class as more than 27. The Metropolitan School Study used the following definition: a small class is equal to or fewer than the median class size for a particular school year; a large class is greater than the median class size for a particular school year. Holland and Galfo (1964) defined class size as the number of pupils who are assigned to a given teacher, or group of teachers, for a given instructional period of time. Ross and McKenna (1955) defined class size as any groups of students scheduled to meet regularly for all or a definite fraction of a school day with one particular teacher for the purpose of learning or being instructed in some specific part of the school's curriculum. These boundaries for small and large classes are mostly assumptions. Clearly, few researchers have agreed upon the dimensions of small and large classes.

Third, there is a problem of qualitative and quantitative research. Many researchers in their haste to produce failed to carefully construct and/or select their research designs, criterion measures, and statistical analyses. Therefore, results are open to questions.

Fourth, there is a problem of failing to control or take into account variables like instructional factors and teacher workload. Critics of class size research suggested that variables such as pupils, teachers, subject matter and method(s) of instruction must either be recognized adequately or controlled since these factors have an important influence on results.

Review of the Literature

Overall research findings have not supported the contention that reduced class size will result in greater academic gains. Indications are, however, that small classes at the primary level positively influence student achievement.

Effects of Class Size in the Elementary Grades

Project Primetime (1982-83) conducted an experimental program to improve students' basic skills in reading, writing, and arithmetic by reducing class size from kindergarten through second grade. Two major results were reported: (1) students in the project scored higher on standardized tests than did students in the larger classes; and (2) teachers reported increased productivity and effectiveness in classes with fewer students.

Andrews (1980-81) designed a study to determine the effect class size had on reading achievement of first grade students. Results indicated that the reading achievement of first grade students in smaller classes, when compared with first grade students in larger classes, was significantly higher.

Tennessee State University (1984), concentrating on economically and educationally disadvantaged students conducted a study to determine the effects of reducing the teacher-student ratio from 1:25 to 1:15 in grades one through three. Reading achievement and math achievement were among the variables studied. Results favored greater achievement in the smaller classes.

The Virginia Beach City Public Schools conducted a project to determine the effect of class size on the reading achievement of first grade students. Results showed that the reading achievement of first grade students in smaller classes was significantly higher than the reading achievement of students in larger classes.

Johnson (1977) examined the effects of class size on the reading and mathematics achievement of first grade pupils. Results indicated that smaller classes significantly affected the reading and overall achievement of the sample studied. However, the difference between pupils' math achievement in smaller and larger classes were so small that one might conclude that they resulted from chance alone.

The Madison Metropolitan School District (1976) measured the effects of class size on the reading achievements of pupils in grades one through three. Variables such as pupils' personal characteristics, e.g., sex, age at entry into first grade, and socioeconomic (SES) level, reading achievement, intelligence and attitude, were measured. The

results indicated that class size in isolation did not affect reading achievement. Other factors, which included prior reading achievement scores, I.Q. scores and teachers' rating of student interest in reading had to be considered.

Murnane (1975) studied the effects of large classes on the reading and mathematics achievement of 875 inner-city black students. It was hypothesized that large classes would lead to decreased pupil achievement. Three samples were studied: the first was in the third grade in 1970-71; the second group was in the second and third grades in 1970-71. Results indicated that the class size had no influence on achievement in either reading or mathematics in either sample.

Menniti (1964) studied the effects of class size on reading and mathematics achievement in elementary schools. Small classes were defined as those with less than 36 pupils and large classes as those with 40 or more. Results indicated that large classes significantly favored achievement gains for average pupils in mathematics and for average pupils in reading.

At this point one is tempted to say that smaller classes probably do have a beneficial influence on achievement at least for younger students and at least in reading and mathematics. However, it is not wise to venture this far, even though it is evident that for the studies reviewed, something occurred in certain classes which did not occur in other classes. *But because class size is a relative matter, one cannot say definitely that small classes contributed to improved reading and mathematics in early grades. More important, the instructional and learning variables, e.g., effective teaching styles and methods, that interacted within each of the classes are not known.* An examination of the classroom processes that effect teaching and learning is necessary prior to reaching defendable conclusions concerning class size.

Effects of Class Size in the Secondary Grades

Summers & Wolfe (1975) studied various school resources to determine which variables were most beneficial to sixth and eighth grade student learning. It was found that class size, among other factors, affected student learning. Sixth graders enrolled in classes of 34 or more reduced achievement growth by 2.1 months. And for eighth graders enrolled in a class of 32 or more class size had a negative effect on achievement.

DeAngelis (1977) studied the effects of class size on the achievement of ninth grade students in a science laboratory course. Two classes of average ability students were formed from the results of the Student Achievement Test (SAT). Twenty-three students were randomly assigned to a small class and 46 students to a large class. Results indi-

Class size research at the secondary levels yielded mixed findings. Some studies show a positive correlation between large classes and pupil achievement, and others favor small classes, and still others favored neither small nor large classes.

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cated that the achievement of students in small classes was not significantly different from that of children enrolled in large classes.

Summers & Wolfe (1975) studied the effects of class size on secondary level English classes. The researchers noted several effects of class size on pupil achievement: (1) larger classes have a negative effect on low achievers, and (2) larger classes have no negative or positive effect on average achievers.

Jeffs & Cram (1968) examined the effects of class size on achievement in business law, introductory business, and government classes. Findings indicated no significant differences in achievement for either group in the two business courses. There was significant difference, however, in favor of the average group in the government course.

Madden (1968) studied the effects of class size on the general mathematics achievement of average ability ninth graders. Students in small classes of 25 to 40 and in large classes of 70 to 85 students were used in the study. The findings indicate no significant differences between the small and large groups at the beginning of the semester. At the end of the semester, the large classes scored significant gains in achievement.

Class size research at the secondary levels yielded mixed findings. Some studies show a positive correlation between large classes and pupil achievement, and others favor small classes, and still others favored neither small nor large classes. One major factor that was evident in a few studies was the positive influence of small classes on disadvantaged and low achieving students.

Factors Which Influence Learning

The focus on the optimum class size tends to obscure a more fundamental and important question: what factors influence learning? A recent review of 3,000 studies on educational productivity (hence referred to as educational achievement) identified nine factors which must be present for learning to occur. These factors fall into three categories: *student aptitude, instruction, and environmental factors*. Each of these appears to be required at least at minimal levels for classroom learning to take place.

Student aptitude includes ability, as measured by standardized tests, development in terms of chronological age or maturation, and personal motivation. These factors, in turn, influence the quality and quantity of instruction, since teachers *may* perform more efficiently in responsive classes.

Instructional factors account for two of the nine identified and include amount of time students engage in learning and the quality of instructional experience (quality takes into consideration psychological as well as curricular aspects of classroom activities). The amount of time students engage in learning is predicated on the underlying assumption that students learn in different ways and at different rates. Effective instruction, therefore, requires both the inclusion of a variety of instructional procedures and learning experiences that match the needs of each student and the allocation of adequate amounts of time for all students to learn. Learning experiences and student characteristics need to be matched in order to maximize the efficiency of learning situations.

Environmental factors were found also to consistently affect learning. Educationally and psychologically stimulating climates of the home, the classroom, social group, peer group attitudes of school, and use of out-of-school time are major contributors to a child's learning success. One pragmatic point made by this distillation of research (Walberg, 1983) is that *educational achievement is dependent upon conditions which are only partly alterable by educators and policymakers. However, since each is necessary in some degree for learning, we are charged with seeking ways to optimize conditions to promote educational achievement.*

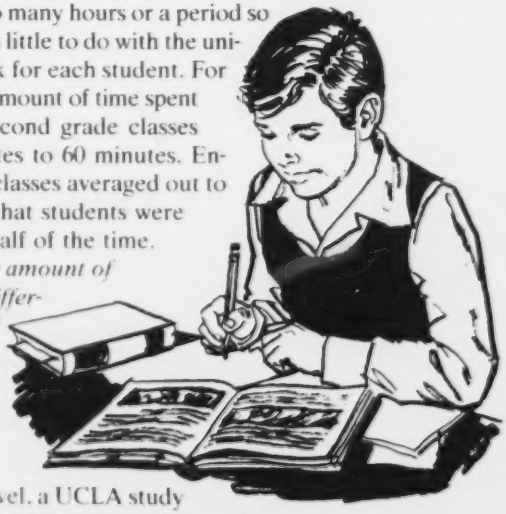
Studies of the effects of teacher management skills on student performance and the effects of school management skills on teacher performance have been conducted in tandem with pupil learning studies. Included in most of these studies, Walberg found, are suggestions on practical methods for policymakers, administrators and teachers to maximize educational achievement.

Increasing Academic Learning Time

An important goal is to increase academic learning time, that is, the amount of time a student spends engaged in an academic task that he or she performs with high success. Academic learning includes three components: time allocated to subject, student engagement with subject, and student success rate with subject.

The National Institute of Education funded a variety of studies on school/classroom management and its relation to learning, notably the Beginning Teacher Evaluation Study (BTES), conducted by the California Commission for Teacher Preparation and Licensing. The six-year study examined student learning, management techniques, and their effects on productivity in terms of learning time.

Students in the classroom, even in the same classroom, spend different proportions of their time actively engaged in their work. Although a school day may be so many hours or a period so many minutes, this has little to do with the uniformity of time on task for each student. For example, the average amount of time spent on mathematics in second grade classes ranged from 25 minutes to 60 minutes. Engagement rate for all classes averaged out to 50 percent, meaning that students were actually doing work half of the time. *Even though the same amount of time was allocated in different classes, it was found that some classes had twice as much time engaged in real work activities, regardless of class size.*



At the secondary level, a UCLA study (1981) noted that a "typical" senior high period consists of approximately 75 percent instruction, with the remainder on routine, including disciplinary, action (Sirotnik, 1981). Verbal interaction has teachers "out-talking" students by a ratio of nearly three to one. Less than five percent of verbal interaction is spent on direct questioning of students and open questions requiring more complex thinking strategies for response. A negligible amount of time is spent on corrective feedback or any reinforcement designed to encourage or to help students understand and correct their mistakes.

Links Between Instructional Management and Educational Achievement

This summary of research leads to areas where efforts are needed to increase educational achievement. Research affirms a long-standing belief that teaching is a complex process of allocating time to instruction and promoting instructional tasks in such a way that focus is on high engagement and success rates, with opportunities to build on acquired skills. Policy *and* practice must focus on: (1) promoting extensive coverage of subject matter; (2) achieving high individual success rate, and (3) active involvement in instructional tasks. These three concepts are interdependent and must be seen as a whole if achievement is to be increased.

Staff development in the management of learning may be the single most important method at our disposal to alter patterns of student achievement. Staff development can assist classroom teachers in the development and use of effective teaching strategies. One aspect focuses on an effort to learn the *use* of student test data for the purpose of focusing and driving instruction at the child's appropriate challenge level. Another aspect involves acquiring the techniques of grouping for instruction. Because students in America pursue learning activities mainly in groups, development in this area is crucial.

Group instruction presents an interesting paradox for teacher planning and teacher management. Because of the diversity of students' abilities in the classroom, for instruction to be effective there must be a good deal of careful planning and attention to and management of the details of both *what is taught* and *what is learned.*

Staff development must also provide classroom teachers with the necessary strategies to individualize instruction *within* and *without* group arrangements. Individualization requires a management system to support the multiple activities that are simultaneously occurring in the classroom. It also requires a management system to assess achievement, to determine what materials are needed, to get the right materials to the right student, to provide instruction in the new material, and to assess student progress.

Ways for teachers to evaluate their own classroom activities and for administrators to facilitate those activities should be sought. Grouping for instruction, evaluating the interdisciplinary integration of curriculum reduction and making better use of transition time between

classes and subjects can impact directly on the factors attributed to educational achievement. Efforts should allow for greater use of tutors, teacher aides, and community volunteers to increase amounts of interactive instruction, thus increasing engagement time. One of the greatest advantages of the use of paraprofessionals is that it allows a reduction in class size which in turn allows more individualization of instruction.

The significance of staff development in the class size debate should not be underestimated. Certain teaching methods associated with productive learning may be easier to carry out when working with smaller groups of students, but it is equally true that teachers need to be trained to use the methods. If teachers persist in using the same strategies with smaller classes that they used in large classes, the advantages of the former will be lost. When fiscal priorities are set, it may prove difficult to maintain both class size reductions and the staff development opportunities needed to correlate those reductions with student achievement.

Educational Know-How Makes the Difference

As demonstrated by the four districts chosen to participate in a 1981 National Institute of Education (NIE) research pilot program to improve productivity, organizational factors such as class size and public or nonpublic status of the school are of little influence on results. Rather, specific goals based on educational productivity and implemented by prepared and committed practitioners can influence results dramatically. The strength of these projects lies in training teachers and administrators to diagnose and prescribe for problems in their own situations, to reinforce learning when it occurs, to learn motivation techniques for staff and students, and to reduce and integrate transition time through scheduling and interdisciplinary methods.

The strength of these projects lies in training teachers and administrators to diagnose and prescribe for problems in their own situations, to reinforce learning when it occurs, to learn motivation techniques for staff and students, and to reduce and integrate transition time . . .

Although many of the preceding concepts are familiar, they can be recast and renewed in light of new research. For educators and policymakers, this is an exciting chance to use new discoveries about learning to make "old truths" realities.

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